

Mucus production in the infected nose and paranasal sinuses

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The normal nasal mucosa contains numerous seromucosal tubulo-alveolar glands which are distributed regularly all over the respiratory region with the gland mass situated in the profound and the superficial layer of the lamina propria. Gland density is appr. 8 glands/mm², somewhat higher in the nasal septum than in the turbinates and significantly higher in the anterior part than in the posterior part of the nose. Totally, appr. 45.000 glands are found in each half of the nose.

In the respiratory epithelium there are mucus producing goblet cells, irregularly distributed with a median density of 5.700 cells/mm² in the septum, 11.000 cells/mm² in the inferior turbinates, and 8.000 cells/mm² in the middle turbinates. Goblet cell density increases in anterior-posterior direction.

In acute inflammatory or infectious conditions of the nose, the mucus production increases considerably, this increase mainly resulting from the increased activity of glands and goblet cells. Probably also the goblet cell density is increased during the acute stage, though this has not been proved quantitatively in the nose. In the lower respiratory tract, in the Eustachian tube and the middle ear we could show an increase of goblet cell density under acute inflammatory conditions. After decrease of the acute stimulus, also the goblet cell density will decrease gradually. In chronic rhinitis the increased mucus production also originates from gland hyperactivity, and probably also from hyperplasia of their secretory elements. In one patient, who died of cancer testis at the age of 20, and who suffered from allergic rhinitis and chronic hypertrophic rhinitis for many years, as well as hypertrofia of the turbinates and chronic maxillary sinusitis, we could postmortally investigate the entire nasal mucosa under the whole mount method, and a considerable increase of gland density was found in all parts of the nose. This shows that in chronic hypertrophic rhinitis and/or chronic allergy, new glands can be formed in the nasal mucosa. Larger materials should be studied to prove this rather isolated but very interesting discovery.

It is well documented that new glands are formed in the middle ear during secre-

tory otitis, and also we have shown new gland formation in nasal polyps due to the infectious nose as well as allergy. Goblet cell density was not increased in the patient in question, but for some years before death he had been treated with Beclometazone.

In chronic bronchitis a considerable increase of goblet cells was found in the lower respiratory tract, as well as in the middle ear and Eustachian tube during secretory otitis.

Generally, we must admit that a detailed knowledge of the mucosal elements in the nasal mucosa under pathological conditions is lacking. Our previous investigations include a survey of the mucosal elements in the normal nasal mucosa and can form the basis of studies of pathological materials.

In the maxillary sinus we have recently carried out systematic studies of goblet cell density during chronic sinusitis. Surprisingly, we found the median density of goblet cells to be lower in chronic maxillary sinusitis (7.400 cells/mm²) than in normal maxillary sinus (9.700 cells/mm²). Interindividual variations were very large (4.200–16.000 cells/mm²), which can partly be explained by a polymorf pathology in the maxillary sinus, for instance a significantly higher density has been found in patients with mucous secretion from the sinus, compared to patients with purulent secretion.

In chronic sinusitis goblet cell density was considerably increased, with a median density of 1.2 glands/mm², compared to 0.2 glands/mm² in normal maxillary sinuses. Different types of new formed pathological glands were found, for instance single, long, or short tubulous glands or different branched tubulous glands. The structure of the glands was definitely pathological and differed from the structure of the sparse sero-mucous glands found in normal sinuses. New formation of glands in chronic sinusitis is part of the hyperplasia of the respiratory epithelium. The increased mucus production in chronic sinusitis thus originates mainly from the pathological new-formed mucus glands.

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